

Claims

1. Power supply apparatus for supplying a direct voltage to a load (2) that is connected to a first terminal (3), the supply apparatus comprising a rechargeable battery (4) for connection to a second terminal (5), and a voltage generator (6) for recharging said battery (4) and supplying power to said load (2),

characterised by first control means (20, 16) for controlledly supplying current from said voltage generator (6) to said first terminal (3) so as to control supply of current from said voltage generator (6) to said load (2) and for preventing reverse flow of current from said first terminal (3) to said voltage generator (6), and

second control means (21) for controlledly supplying current between said first (3) and second (5) terminals so as to control supply of current from said voltage generator (6) through said first control means (20, 16) to said battery (4) and from said battery to said load (2).
2. Power supply apparatus as claimed in claim 1, wherein said first and second control means (20, 16; 21) are arranged to present selectively a high impedance state (23), a low impedance state (26) or a controlled impedance state (29, 32), said controlled impedance state (29, 32) controlling the magnitudes of the currents supplied by said first and second control means (20, 16; 21) respectively.
3. Power supply apparatus as claimed in claim 2 wherein said second control means (21) is responsive to the presence of a low battery voltage at said second terminal (5) to present said controlled impedance state between said first (3) and second (5) terminals so as to apply a controlled voltage at said first terminal (3) greater than said low battery voltage.
4. Power supply apparatus as claimed in claim 2 or 3 wherein said control means (20, 16; 21) are responsive to a battery voltage less than full charge to present

- said controlled impedance state so that said voltage generator (6) supplies current both to said battery (4) and to said load (2).
5. Power supply apparatus as claimed in any of claims 2 to 4 wherein said first control means (20, 16) is responsive to a battery voltage substantially equal to full charge to present said high impedance state so as to disconnect said voltage generator (6) from said battery (4) and said load (2).
 6. Power supply apparatus as claimed in any of claims 2 to 4 wherein said second control means (21) is responsive to a battery voltage substantially equal to full charge to present said high impedance state so as to disconnect said battery (4) from said voltage generator (6) and said load (2).
 7. Power supply apparatus as claimed in any of claims 2 to 6 wherein said control means comprises field-effect transistors and means (12) for controlling said field-effect transistors to present selectively said high impedance state, said low impedance state or said controlled impedance state.
 8. Power supply apparatus as claimed in claim 7 wherein said first control means (20, 16) comprises at least a first one (21) of said field-effect transistors connected in series between said voltage generator (6) and said first terminal (3) for controlling supply of current from said voltage generator (6) to said first terminal (3) and a second element (16) connected in series between said voltage generator (6) and said first terminal (3) for preventing reverse flow of current from said first terminal (3) to said voltage generator (6).
 9. Power supply apparatus as claimed in claim 8 wherein said second element (16) comprises a second one of said field-effect transistors.
 10. Portable radio communication apparatus comprising a communication module and power supply apparatus as claimed in any preceding claim for supplying power to said communication module as said load.